Impact of extreme forming conditions on glass properties

- An Invited Talk

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Abstract

By applying extreme thermal or mechanical conditions to a supercooled liquid, one can get glass states with extraordinary structure and properties. Studies of such glass states will be crucial for a deep understanding of nature of glass and glass transition. Here we present our recent studies dealing with the effect of extreme glass-forming conditions (e.g. hyperquenching, extremely high force drawing and milling) on glass properties. First, we show the severe consequences of hyperquenching to glass transition, atomic vibrational dynamics, microstructure and physical properties of glasses. For such studies, both poor oxide and non-oxide glass formers are used as objects. Second, we explore the impact of extremely large drawing force on the structure and mechanical properties of oxide glass fibers. Finally, we show the strong influence of extreme crushing conditions on the vitrification process of several selected non-oxide materials and on some physical properties of the derived glasses. This study sheds light on the glass transition and formation mechanism of the mechanically derived glasses.

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